

An evaluation of surface thermal lensing technique for low level absorption measurements of high performance multilayered optical coatings

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Surface thermal lensing is an alternate configuration of a photothermal deflection system that was used to measure low levels of optical absorption. The thermal lensing configuration facilitated the alignment of the pump and probe laser beams by using a larger diameter probe beam. This technique was applied to high performance optical coatings, specifically high reflectors at 511 nm, zero degrees angle of incidence. The absorption of these coatings were previously measured using a high power copper vapor laser system. A high power copper laser beam is focused onto a ≈ 2 mm diameter spot. A thermal camera senses the temperature rise with respect to the rest of the coating. The temperature change, power density and beam diameter are inputted into an empirical formula that yields optical absorption. The surface thermal lensing technique was able to resolve absorption levels lower than that achieved with the copper laser method. Detailed discussions will be presented of the calibration procedures and the comparison between the two techniques used.

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